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AUTHOR Oberlin, Lynn
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ABSTRACT

Described is an experimental program for elementary education and early childhood education at the University of Flori . The program is based on ten years of research and on four major assumptions: (1) learning is made personally meaningful and relevant, (2) learning is adjusted to the rate and needs of the individual, (3) there is a great deal of self direction, and (4) there is a close relationship between theory and practice. The New Elementary Program (NEP), now renamed Childhood Education Program (CEP), consists of a Seminar, considered the heart of the program; Field Experience, Substantive Panel which is built around the learning activities which students are to complete, and Evaluation. The Science Education component sets a requirement of six learning activities in science. Included are: (1) attendance at Science Orientation Sessions and demonstrate competence in science content, (2) learn to use the Science Teacher Observation Rating Form (STORF) and demonstrate competence observing two taped situations, (3) learn about such programs as AAAS, ESS, SCIS, and perform activities from these, (4) develop and plan materials, (5) carry out laboratory investigations in the various sciences, and (6) demonstrate an understanding of the "Processes of Science." The program is considered much stronger than the traditional program. (EB)

# Teaching Science Education in Florida's New Elementary Programs

Speech given by

Dr. Lynn Oberlin

College of Education

University of Florida

CESI

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How would you like to teach science education as a part of a teacher education program where:

Courses and regularly scheduled classes do not exist.

Letter grades such as A, B, C are not used.

Field experience in the public school is a part of each student's program throughout his junior and senior year.

Students work at their own pace.

The program may be completed in different amounts of time.

Operational costs must not exceed those of the regular program.

Planning and decision making is a cooperative decision between students and faculty.

Students are responsible for their own education.

The orientation of the program is humanistic, not behavioristic.

This program exists for elementary education and early childhood education at the University of Florida. It had it's start as an experimental program in 1969. The program is based on ten years of research by Arthur Combs and associates at the University of Florida and involves findings of the nature of effective workers in the helping professions. These research findings are summarized in Florida Studies in the Helping Professions, published by the University of Florida Press in 1959. The underlying theories for the New Elementary Program are outlined by Dr. Combs in his book, The Professional Education of Teachers, A Perceptual View of Teacher Education, published by Allyn and Bacon in 1965. The program was based on four major assumptions. A person learns best when:

1. Learning is made personally meaningful and relevant.
2. Learning is adjusted to the rate and needs of the individual.
3. There is a great deal of self direction.
4. There is a close relationship between theory and practice.

A condition from the start of the program was that it would not cost more than the regular program as it was not supported by any funds from outside the college but had to operate from the regular budget.

From the helping relationship research, faculty experiences, perceptual humanistic psychology, and the four basic assumptions just stated, the program was organized around the following principles.

1. The self as instrument concept.

To be effective, the teacher must use himself, his knowledge of children, and his knowledge of subject matter.

2. Student responsibility and self direction.

In this program, the student is responsible for his own education and

has maximum opportunities for self direction.

3. Maximum flexibility.

Inasmuch as students come from varying backgrounds with different needs, the program is designed to let students adjust to such needs and complete different programs of instruction at varying rates.

4. Close relationship of didactic instruction and practical experience.

For learning to take place, students must see a relationship between what they are supposed to learn and their need for the information in a practical setting. Participation in actual teaching begins early in the program, relating learning to need. Then there is opportunity for students to pursue learning which is relevant to them.

The New Elementary Program known as NEP, operated alongside the regular or traditional program. This gave a chance to observe and conduct research comparing the two programs. One of the studies involved the comparison of the teachers' evaluation of the training programs. The population was teachers at the end of their first year of teaching. The same instrument was used for the NEP students and a control group selected from our regular program. The results clearly favor the NEP group. Significant at the five percent level was the area of competence to deal with teaching and at the one percent level were the areas of program content, changes in values, self initiation, field experiences, and skill and knowledge in helping others to develop. Another instrument used was the Florida Rating Scale for First Year Teachers. It was filled out by the principals of these same teachers. The results on all 14 items favored the NEP group. Only one item was significant at the five percent level. It had to do with capacity to adjust with changing conditions. The one item significant at the one percent level was relationships with parents.

After observing and comparing the two programs, NEP and the traditional program for over three years, the Department of Childhood Education decided to make the NEP program its official program and to phase out the traditional program. One of the strengths of the NEP program was its size. The department decided not to make one hugh program but to form five separate NEP groups. The second of these groups started fall, 1972. The material contained in this report deals with the NEP groups one and two. The third group was started in January, 1973, and the fourth group started at the end of March, 1973. Because of this becoming our regular program, we decided NEP, New Elementary Program, was no longer an appropriate name and we renamed our program Childhood Education Program, CEP. In fall, 1973, we will have in operation five CEP groups and our traditional program will have been phased out.

## SEMINAR

The seminar is the heart of the program. When a student enters, he is assigned to a seminar with 29 other students. These students remain in the same seminar as long as they are in the program and work with the same seminar leader. The seminar is divided into two groups of 15 students. Each of these meet as a group with the seminar leader two hours each week. It is here that education really becomes personal and humanistic. The students in these groups get to know each other and the faculty member very well. The seminar provides for guidance, counseling, and open discussion about educational practices and theory, and how they relate to the student as a person and as a professional. The seminar serves as a support system for the student. It is not uncommon to see students in a seminar rally around a fellow student, ptiching in with a common effort, to help solve

that student's problem. Students can really open up about their personal and professional concerns.

## FIELD EXPERIENCE

Field experience is a very important part of this program. Students are continuously engaged in field experience during their upper division, junior and senior college years. Through field experiences, we try to provide:

1. A wide variety of in school and out of school experience.
2. Participation based on student need and readiness.
3. Increasing time in the classroom and depth of responsibility at each level.

Our levels in the program provide for the above to happen. The five levels are:

1. Observation and tutoring - five hours per week.
2. Teacher initiate - six hours per week.
3. Teacher Assistant - ten hours per week, five days per week.
4. Teacher Associate - a daily experience, ten hours per week.
5. Intensive Teaching - five weeks of full time teaching in the final quarter.

Although the field experience component operates with no formal supervision by a college supervisor, we do have contact with the school. A University faculty member visits the classroom only when requested by the teacher or teacher trainee.

## SUBSTANTIVE PANEL

The substantive panel is made up of faculty members who usually teach methods, curriculum, and foundation classes. The areas included are science,

mathematics, social studies, reading, language arts, art, music, health, physical education, sociological foundations, psychological foundations, and curriculum. The faculty member in each of these areas distributes a list of learning activities which students are to complete. Some activities are required of all students. There are some from which students can select or choose the activities they wish to do. Students are encouraged to propose or negotiate activities of their own. The first activity on each list is to attend orientation sessions. Before students can start working in any area, they must start orientation sessions. In each of the areas, students are required to complete a certain number of learning activities. In science, the number is six. Students are also required to go beyond the minimum in three of these areas. This means that in three areas students must do more than the minimum requirements. Exactly just what is to be done, is defined by each of the substantive panel members. In Science, going beyond the minimum means doing one additional learning activity. This may be from the list or one which the student supplies or negotiates.

Learning Activities may be completed in any number of different ways. A student may work on his own and submit evidence that the activity has been completed. This evidence may be in the form of a written paper or a conference with the substantive panel member. In some areas study groups are formed where students working on the same activity meet with the faculty member at a certain time. These are elective as to whether the student wishes to sign up; however, once a student signs up, he must attend. In Science, many of the activities are completed in an open laboratory situation.

## EVALUATION

While letter grades are not given in the program, evaluation does take place. There is an entrance assessment at which time students' lower divi-

sion or junior college work is assessed. Dificiencies for entrance to the college of education are noted and plans are made for the student to start work in the program. At midpoint, approximately half way through the program, there is a diagnostic review and plan for the future. This takes place with the student, the student's seminar leader, and one or two members of the substantive panel. At this time, the student presents evidence of what he has completed and of his plans for completing the rest of the work in a certain amount of time.

Continuous evaluation also takes place. In the seminar, evaluation of the student's progress is constantly taking place. In each of the substantive areas every time a learning activity is completed, the student is given a learning activity slip. Every activity attempted by students is not accepted by faculty members. The student's work must be well done. If not, it is handed back to him or in a conference he is told that it is not acceptable. The reasons are given and he must take it back, rework it, and submit it again. There is no failure but success is not automatic. Evaluation also takes place during field experiences. Part of this evaluation is in the public schools with the teacher. Some evaluation of field experiences takes place in the seminar.

Before any student graduates, there is a final evaluation. This final evaluation takes place with the student, the students' seminar leader, and one or two members of the substantive panel. At this time the student's entire progress, from the beginning of the program to the end, is reviewed. If the student has completed all requirements satisfactorily, the student is graduated and certified to teach. The seminar leader writes a letter about each student and it becomes a part of the student's permanent record.

In writing this letter, the seminar leader utilizes material from each of the substantive panel members. This letter considers student's strengths and weakness, our assessment of his ability to do graduate work and to enter a job in his chosen field.

## THE SCIENCE EDUCATION COMPONENT

Students in the New Elementary Program must complete six learning activities in science. The first four activities are required. Orientation sessions are prerequisite to other activities. In the area of science the only activity that requires that a student be in a certain place at a certain time is the science orientation sessions. Let's take a closer look at the science learning activities.

1. Attend Science Orientation Sessions and demonstrate competence in science content. (Science content module available)

   There are four 50 minute orientation sessions which the students are required to attend. These include a very close look at science learning activities so that the student can become completely familiar with what is expected of him, a pretest in science content, and a search for the answer to the question, "What is science and where does it fit in the elementary school?" The requirement to demonstrate competence in science content grew out of research which was conducted last year. The question was continuously being raised as to whether our New Elementary Program students were well prepared because they were not receiving any basic science content as was being taught in our traditional science methods courses. Both groups have to meet the same college of education entrance

requirement of 15 term hours of content science courses. To try and answer this question we administered a junior high school content test to our graduating seniors last spring in both the regular program and the NEP. The results showed that the NEP students were about one and a half raw score points ahead of the students in our traditional program although there was no satistically significant difference. This part of the study looked good but as we analyzed the data further, we found that the students in neither program really knew very much science content. It was decided that there should be some kind of requirement in content science competence for all of the students in the New Elementary Program, sections one and two. This requirement needed to be realistic in view of these test results and not as rigorous as I would like it to be. After further analyzing this and other data from science content tests which had been given, it was decided that students would demonstrate competence in science content by obtaining a score on a standardized test at or above the 75 percentile for end of the year ninth grade students. While this requirement may seem a little low, approximately half of our students that graduated last year did not meet it. The pre-test given as a part of orientation will meet this requirement for more than half of the students. If they do not score at this level on the test, there is a module available which will help them to become more proficient in science content. Tests are given twice each term. Inasmuch as several different tests are used, it is unlikely that a student will take the same test twice. The science content competence requirement

must be completed before I will sign the slip that says the student has completed the science area.

2. Learn to use the Science Teacher Observation Rating Form (STORF) and demonstrate competence observing two taped situations. As a member of a three person team, observe (with the STORF) at least two science lessons being taught and teach at least one lesson which is observed (with the STORF) by two team members.

   This is required of all students. The STORF is an instrument being developed at the University of Florida to observe practices of teachers teaching science to elementary children. While using the instrument the observer observes three five-minute segments of the lesson and checks what he has observed. As the blank used to record the observations is organized, there are two kinds of teacher behavior, Behavior A and Behavior B. One is essentially traditional behavior, the other is called experimental behavior. By observing teacher behavior on tapes, students can begin to find out the kind of teacher they would like to be. By observing classmates and having classmates observe them, they can see if they are doing the kinds of things that the teacher they would like to be normally does. The items observed are the kinds of things that happen in most classrooms. We have never observed any teacher that entirely fits into one category, but the frequency and type of the acts help to characterize the teacher.

3. Learn about new programs in elementary school science (AAAS, ESS, SCIS). Examine and perform the activities for six units. This must include at least two of the programs.

This activity is required of all students. It gives the student a chance to learn about these programs and examine materials he will be working with. This activity pretty well restricts itself to being done in our laboratory as it's about the only place the student can find all the materials he needs. If he can locate them elsewhere, he may do his work in another place.

4. Develop plans and materials, and use four of the following techniques in teaching science to children: a. Science Center Component b. Counterintuitive (Discrepant Events) c. Pictorial Riddles d. Open-ended investigation e. Inductive Teaching.

   The actual teaching sessions for these techniques take place in the public schools. Much of the planning takes place at the university in the science lab or my office.

The rest of the learning activities are <u>not</u> required, however, the student must complete at least six learning activities in all. The remaining activities are selected from the list or proposed by students.

5. Select and carry out two laboratory investigations in each of the following areas: a. Physical Science b. Life Science c. Earth Science. (Three different sources are required.)

   The laboratory investigations must be appropriate for the level that the student is preparing to teach. Students are encouraged to use themselves as one of the sources required and to design their own investigation. While not a requirement, many of our students do these investigations with children in the public schools. When possible, they are encouraged to do so.

6. Present evidence that scientific information has been learned in two areas of physical science and two areas of biological science. Two sources of adult material must be used for each area. (Areas must be narrow in scope.)

This is the place for the student who is really interested and wants to learn more about some things in science. This is not an item that would really help in re[illegible] the science content test. Here students are asked to choose a very narrow area and explore it in depth. For example, the area of weather would be inappropriate. However, tornadoes might be an appropriate topic. Likewise, insects would be inappropriate but termites might be an appropriate topic. Information for each topic must come from at least two sources of adult material. This is to distinguish it from elementary school materials and textbooks. These students are juniors and seniors and should be working with adult content material. Once finished, the student may present the evidence in a conference with me or it may be presented in a short written review of the material, listing the sources used.

7. Demonstrate an understanding of the "Processes of Science." (Module available)

The module is based on such processes as inferring, observing, hypothesizing, predicting, and classifying. Students demonstrate understanding by taking a test over this material and achieving a score of 80%. The module deals with each of the processes separately and gives students the opportunity of working with printed material and listening to tapes. There are two forms of

the test, so a student who tries and does not pass, may come back at a later date and try again.

8. Plan and teach a science UNIT (several lessons) to children. The following must be provided for: Active involvement of children, differing achievement and ability levels of children, general student planning, student choices, student planned inquiry, use of manipulative materials.

   The teaching of this unit takes place in the public schools. Generally this takes place near the end of the student's program. It may be during intensive or before.

9. Teach a UNIT (several lessons) of one of the new programs (AAAS,SCIS, ESS) to children. Learning activity #3 is a prerequisite.

   Learning activity three is the one where students learn about the new programs and do some of the activities with the materials from these programs. Activity nine takes place in the public schools. The only problem we have with this activity is that many of the schools in our area are not well equipped with materials from these programs. Aside from material shortages, this activity works well for many students. It usually takes place near the end of a student's program, during the intensive or before.

10. Evaluate two state adopted textbook series at three consecutive levels. All series must be evaluated at the same levels.

    In the state of Florida there are four state adopted textbook series for use in the elementary school. For this requirement the student picks two of the four series and examines at least

three levels such as grades two, three, and four of each of the two series. While a student may develop his own evaluation form, most prefer to use one which I have developed. The books are available in the library where students can check them out for short periods of time. Although I don't advocate a textbook program for science in elementary school, the book is apt to be the only thing in the science area that many teachers find provided by the school. This activity gives students a chance to look over the books and become familiar with them.

11. Propose other learning activities which will help the student to become a better teacher of Science in the elementary school.

    Here is where the student can suggest things relative to his needs. Many of these come from opportunities that the student has in his field experience. When there are things he wants to do, things he wants to learn, he will propose an activity and call it Number 11. We encourage this activity to be used and it is used a lot. Learning activity eleven may be repeated an indefinite number of times as long as each time is different.

The following statement is probably the most inportant one on the whole learning activity sheet. It comes at the bottom and is printed in capital letters. THE ABOVE ACTIVITIES MAY BE AMENDED OR CHANGED COMPLETELY THROUGH STUDENT-INSTRUCTOR AGREEMENT. Our students are told that if this program does not meet their needs, if it does not seem relevant, or if they are asked to do things that they have done before, to come in and talk it over. The two of us can probably come up with something that will be much more meaningful.

In the Science area, there is nothing that any student is required to do at any specific time. Once the student signs up for orientation sessions, he is expected to attend those four meetings at the established time. All other activities in the area of science are handled in an open laboratory situation. Students are given the time when I will be in the lab and told they can come and work on any activity. They can ask me any questions regarding the science area. This is done to insure maximum flexibility for students. It lets them work with things that concern them and are relevant to them at the time. Students do not have to sign up for open laboratory. Attendance varies greatly. I have had over 50 students in a small lab room and as few as two or three.

Students are encouraged to spend several quarters working in the science area. Most students start science during their first or second quarter in the program. Some of the activities are very difficult for a student at this level to complete. Activities which require actual teaching in the public schools generally are not completed until the third quarter or later.

While grades such as A, B, C, are not given to any student in science education, I am demanding higher quality work than I did in the traditional program. If an activity is turned into me that I feel is not up to standard, I turn it back to the student as not accepted. Under the traditional program, I accepted it and just put a lower grade on it.

With the traditional program we were pretty well boxed in to a 10 week term. Students started science education and completed it within the term. This limited the kinds of things we could ask students to do. This also limited my effectiveness as an instructor because I was presenting material to a student one quarter which he had no need for until two or three quarters later.

The way it is set up under our New Elementary Program, he can work on those things which seem relevant to him this quarter, postponing others until later. This system also provides him with a faculty member in each of the areas, including science education, that he may contact and work with at any time. Instead of having me available to work with him one quarter only, he has me available during his entire program. Students come in during their intensive with some problems in science education and ask for help.

This program is much stronger than our traditional program as it puts science education into a continuous format for students during their entire last two years in college and lets them operate in a program of high standards demanding excellence before activities are accepted. While a student does not have to attend regular sessions, he does have to convince me with each activity that he has done it satisfactorily. He must complete all requirements in the science area satisfactorily before I will sign a completion slip for him and write a paragraph evaluating him in the area of science education.

As the N.E.P. experiemental program becomes the regular program and new sections are organized, individual roles change. As of March 25, 1973 I am no longer working with science education in C.E.P. 1 or C.E.P. 11. (C.E.P. is now what the N.E.P. is called) I am now the team leader for C.E.P. 1V and will also work with science education in this team.